

**REMARKS**

The applicants have carefully considered the official action dated April 9, 2007, and the references cited therein. In the official action, claims 1-4 and 11-22 were rejected under 35 U.S.C. § 102(e) as anticipated by Kimerling; claims 1-8 and 10-22 were rejected under 25 U.S.C. § 102(e) as anticipated by Towle et al. (US 6,834,133); and claims 1-3, 7, 9-10, 23, and 24 were rejected under 35 U.S.C. § 102(e) as anticipated by Kitamura et al. By way of this response, the applicants have amended claims 1, 11, 19, and 23 and added claims 45-50. No new matter has been added. Accordingly, claims 1-24 and 45-50 are pending in this application, of which claims 1, 11, 19, and 23 are independent. In view of the foregoing amendments and the following remarks, the applicants respectfully traverse the rejections and respectfully submit that all claims are in condition for allowance.

**I. Independent Claims 1, 11, and 19**

The applicants respectfully submit that independent claim 1 is allowable over the art of record. Independent claim 1 is directed to an apparatus that includes, *inter alia*, an optical element on a bottom surface of an optoelectronic chip directly engaging a top surface of a waveguide. Kimerling does not describe or suggest an optical element on a bottom surface of an optoelectronic chip directly engaging a top surface of the waveguide. Instead, Kimerling describes Ge detectors (12) on a top surface of an optical chip (6). *See Kimerling, ¶ [0011].* Thus, Kimerling does not describe or suggest an optical element on a bottom surface of an optoelectronic chip directly engaging a top surface of a waveguide.

Turning to Towle et al. and Kitamura et al., Towle et al. do not describe or suggest an optical element directly engaging a waveguide as recited in claim 1. On the contrary, Towle et al. describe coupling an optical element (116) to a waveguide (112) via an optical solder

(118). *See Towle et al.*, FIG. 2 and 3:53-55. Thus, Towle et al. do not describe or suggest an optical element directly engaging a waveguide as recited in claim 1.

Kitamura et al. also do not describe or suggest an optical element directly engaging a waveguide as recited in claim 1. On the contrary, Kitamura et al. describe a light-emitting element (23a) that is separated from a waveguide (30) by a gap. The gap between the light-emitting element (23a) and the waveguide (30) is created upon removal of a second substrate (40) between the light-emitting element (23a) and the waveguide (30). *See Kitamura et al.*, ¶'s [0048] and [0051]. Thus, because removal of the second substrate 40 results in a gap between the light-emitting element (23a) and the waveguide (30), the light-emitting element (23a) does not directly engage the waveguide (30). Kitamura et al. also describe a light-receiving element (26a) that is separated from the waveguide (30) by an interposing transparent substrate (10). *See Id.*, ¶'s [0043] and [0044]. Therefore, the light-receiving element (26a) does not directly engage the waveguide (30). Thus, Kitamura et al. do not describe or suggest an optical element directly engaging a waveguide as recited in claim 1. Accordingly, the applicants respectfully submit that independent claim 1 and all claims dependent thereon are in condition for allowance.

The applicants respectfully submit that independent claim 11 is also allowable over the art of record. Claim 11 is directed to an apparatus that includes, *inter alia*, a flip-chip having a bottom surface and an optical element on the bottom surface that directly engages a top surface of a waveguide. Kimerling does not describe or suggest a flip-chip having a bottom surface and an optical element on the bottom surface that directly engages a top surface of a waveguide. Instead, Kimerling describes Ge detectors (12) on a top surface of an optical chip (6). *See Kimerling*, ¶ [0011]. Thus, Kimerling does not describe or suggest an

optical element on a bottom surface of a flip-chip that directly engages a top surface of a waveguide.

In addition, neither Towle et al. nor Kitamura et al. anticipate claim 11. In particular, as discussed above in connection with claim 1, neither Towle et al. nor Kitamura et al. describe or suggest an optical element that directly engages a waveguide. Accordingly, the applicants respectfully submit that claim 11 and all claims dependent thereon are in condition for allowance.

The applicants respectfully submit that independent claim 19 is also allowable over the art of record. Independent claim 19 is directed to an apparatus that includes, *inter alia*, first and second plurality of solder bumps having a combined thickness prior to soldering which is greater than a height of a waveguide to cause the optical element to directly engage a top surface of the waveguide after a soldering process. As discussed above in connection with claims 1 and 11, Kimerling does not describe or suggest an optical element that directly engages a top surface of a waveguide. In addition, as discussed above in connection with claims 1 and 11, neither Towle et al. nor Kitamura et al. describe or suggest an optical element to directly engage a top surface of a waveguide. Accordingly, the applicants respectfully submit that independent claim 19 and all claims dependent thereon are also in condition for allowance.

## **II. Claims 13-19 are Structural Claims, Not Product by Process Claims**

In the official action, the examiner suggests that the limitation “the first and second plurality of solder bumps having a combined thickness prior to soldering which is greater than a height of the waveguide” in claim 19 and limitations in claims 13-18 make these claims product by process claims. *The official action dated April 9, 2007, p. 6.* Turning to

claim 19, the applicants respectfully submit that this claim is not a product by process claim. Instead, claim 19 defines an apparatus at a particular stage in a fabrication process and it is that apparatus which is claimed. Accordingly, this claim is a structural claim and not a product by process claim. Accordingly, the rejections of claim 19 are based on an incorrect reading of claim 19 and should be withdrawn.

For similar reasons, claims 13-18 are also not product by process claims. Accordingly, the rejections of claims 13-18 are also based on an incorrect reading thereof and should be withdrawn.

### **III. Independent Claims 23**

The applicants respectfully submit that independent claim 23 is allowable over Kitamura et al. Independent claim 23 is directed to an apparatus that includes, *inter alia*, an optically active waveguide and a passive waveguide that is not configured to conduct light, and which is located to maintain a separation between a flip-chip and a substrate. Kitamura et al. do not describe or suggest an optically active waveguide and a passive waveguide not configured to conduct light, or locating such a waveguide to maintain a separation between a flip-chip and a substrate. On the contrary, Kitamura et al. describe only one waveguide (30) having a core (30a) and cladding layers (30b). *See Id.*, FIG. 2 and ¶ [0041]. The core (30a) and the cladding layers (30b) do not form active and passive waveguides, but instead form the same optically active waveguide (30). The core (30a) and the cladding layers (30b) are all necessarily optically active because light must transmit through all of the layers to travel between the light-emitting element (23a) and the light-receiving element (26a). Thus, Kitamura et al. do not describe or suggest an optically active waveguide and a passive waveguide that is not configured to conduct light but is located to maintain a separation

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between a flip-chip and a substrate. Accordingly, the applicants respectfully submit that independent claim 23 and claim 24 dependent thereon are in condition for allowance.

**IV. Conclusion**

In view of the foregoing, the applicants respectfully submit that all pending claims are allowable over the art of record and that this application is in condition for allowance. Favorable reconsideration is respectfully requested. The Commissioner is hereby authorized to refund any overpayment and charge any deficiency in the amount enclosed or any additional fees which may be required during the pendency of this application under 37 CFR 1.16 or 1.17 to Deposit Account No. 50-2455. A copy of this paper is enclosed.

Respectfully submitted,

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**October 5, 2007** By: /James A. Flight/

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